

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Sadanand V. Deshpande, et al.

Examiner: Wojciechowicz, Edward J.

Serial No: 10/751,831

Docket: FIS920030078US2 (16422A)

Filed: January 5, 2004

Art Unit: 2815

Dated: November 15, 2004

For: STI STRESS MODIFICATION BY NITROGEN PLASMA TREATMENT FOR IMPROVING PERFORMANE IN SMALL WIDTH DEVICES

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Sir:

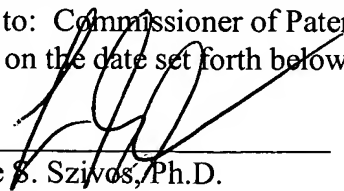
Pursuant to 37 C.F.R. §§1.56, 1.97 and 1.98, applicants submit the following references which applicants believe may be material to the above-identified patent application. A copy of the references which applicants wish to make of record in this case is enclosed herein for the Examiner's convenience along with a listing on Form PTO-1449 attached.

1. U.S. Patent No. 3,602,841, dated August 31, 1971, issued to McGroddy;
2. U.S. Patent No. 4,655,415, dated May 12, 1987, issued to Esaki, et al.;
3. U.S. Patent No. 4,853,076, dated August 1, 1989, issued to Tsaur, et al.;

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, P.O. Box 1450, Alexandria, VA 22313-1450 on the date set forth below.

Dated: November 15, 2004



Leslie S. Szivos, Ph.D.

4. U.S. Patent No. 4,855,245, dated August 8, 1989, issued to Neppl, et al.;
5. U.S. Patent No. 4,952,524, dated August 28, 1990, issued to Lee, et al.;
6. U.S. Patent No. 4,958,213, dated September 18, 1990, issued to Eklund, et al.;
7. U.S. Patent No. 5,006,913, dated April 9, 1991, issued to Sugahara, et al.;
8. U.S. Patent No. 5,060,030, dated October 22, 1991, issued to Hoke;
9. U.S. Patent No. 5,081,513, dated January 14, 1992, issued to Jackson, et al.;
10. U.S. Patent No. 5,108,843, dated April 28, 1992, issued to Ohtaka, et al.;
11. U.S. Patent No. 5,134,085, dated July 28, 1992, issued to Gilgen, et al.;
12. U.S. Patent No. 5,310,446, dated May 10, 1994, issued to Konishi, et al.;
13. U.S. Patent No. 5,354,695, dated October 11, 1994, issued to Leedy;
14. U.S. Patent No. 5,371,399, dated December 6, 1994, issued to Burroughes, et al.;
15. U.S. Patent No. 5,391,510, dated February 21, 1995, issued to Hsu, et al.;
16. U.S. Patent No. 5,459,346, dated October 17, 1995, issued to Asakawa, et al.;
17. U.S. Patent No. 5,471,948, dated December 5, 1995, issued to Burroughes, et al.;
18. U.S. Patent No. 5,557,122, dated September 17, 1996, issued to Shrivastava, et al.;

19. U.S. Patent No. 5,561,302, dated October 1, 1996, issued to Candelaria;
20. U.S. Patent No. 5,565,697, dated October 15, 1996, issued to Asakawa, et al.;
21. U.S. Patent No. 5,571,741, dated November 5, 1996, issued to Leedy, et al.;
22. U.S. Patent No. 5,592,007, dated January 7, 1997, issued to Leedy;
23. U.S. Patent No. 5,592,018, dated January 7, 1997, issued to Leedy;
24. U.S. Patent No. 5,670,798, dated September 23, 1997, issued to Schetzina;
25. U.S. Patent No. 5,679,965, dated October 21, 1997, issued to Schetzina;
26. U.S. Patent No. 5,683,934, dated November 4, 1997, issued to Candelaria;
27. U.S. Patent No. 5,840,593, dated November 24, 1998, issued to Leedy;
28. U.S. Patent No. 5,861,651, dated January 19, 1999, issued to Brasen, et al.;
29. U.S. Patent No. 5,880,040, dated March 9, 1999, issued to Sun, et al.;
30. U.S. Patent No. 5,940,736, dated August 17, 1999, issued to Brady, et al.;
31. U.S. Patent No. 5,946,559, dated August 31, 1999, issued to Leedy;
32. U.S. Patent No. 5,960,297, dated September 28, 1999, issued to Saki;
33. U.S. Patent No. 5,989,978, dated November 23, 1999, issued to Peidous;
34. U.S. Patent No. 6,008,126, dated December 28, 1999, issued to Leedy;
35. U.S. Patent No. 6,025,280, dated February 15, 2000; issued to Brady, et al.;

36. U.S. Patent No. 6,046,464, dated April 4, 2000, issued to Schetzina;
37. U.S. Patent No. 6,066,545, dated May 23, 2000; issued to Doshi, et al.;
38. U.S. Patent No. 6,090,684, dated July 18, 2000, issued to Ishitsuka, et al.;
39. U.S. Patent No. 6,107,143, dated August 22, 2000, issued to Park, et al.;
40. U.S. Patent No. 6,117,722, dated September 12, 2000, issued to Wu, et al.;
41. U.S. Patent No. 6,133,071, dated October 17, 2000, issued to Nagai;
42. U.S. Patent No. 6,165,383, dated December 26, 2000, issued to Chou;
43. U.S. Patent No. 6,221,735, dated April 24, 2001, issued to Manley, et al.;
44. U.S. Patent No. 6,228,694, dated May 8, 2001, issued to Doyle, et al.;
45. U.S. Patent No. 6,246,095, dated June 12, 2001, issued to Brady, et al.;
46. U.S. Patent No. 6,255,169, dated July 3, 2001, issued to Li, et al.;
47. U.S. Patent No. 6,261,964, dated July 17, 2001, issued to Wu, et al.;
48. U.S. Patent No. 6,265,317, dated July 24, 2001, issued to Chiu, et al.;
49. U.S. Patent No. 6,274,444, dated August 14, 2001, issued to Wang;
50. U.S. Patent No. 6,281,532, dated August 28, 2001, issued to Doyle, et al.;
51. U.S. Patent No. 6,284,623, dated September 4, 2001, issued to Zhang, et al.;
52. U.S. Patent No. 6,284,626, dated September 4, 2001, issued to Kim;

53. U.S. Patent No. 6,319,794, dated November 20, 2001, issued to Akatsu, et al.;
54. U.S. Patent No. 6,361,885, dated March 26, 2002, issued to Chou;
55. U.S. Patent No. 6,362,082, dated March 26, 2002, issued to Doyle, et al.;
56. U.S. Patent No. 6,368,931, dated April 9, 2002, issued to Kuhn, et al.;
57. U.S. Patent No. 6,403,486, dated June 11, 2002, issued to Lou;
58. U.S. Patent No. 6,403,975, dated June 11, 2002, issued to Brunner, et al.;
59. U.S. Patent No. 6,406,973, dated June 18, 2002, issued to Lee;
60. U.S. Patent No. 6,476,462, dated November 5, 2002, issued to Shimizu, et al.;
61. U.S. Patent No. 6,493,497, dated December 10, 2002, issued to Ramdani, et al.;
62. U.S. Patent No. 6,498,358, dated December 24, 2002, issued to Lach, et al.;
63. U.S. Patent No. 6,501,121, dated December 31, 2002, issued to Yu, et al.;
64. U.S. Patent No. 6,506,652, dated January 14, 2003, issued to Jan, et al.;
65. U.S. Patent No. 6,509,618, dated January 21, 2003, issued to Jan, et al.;
66. U.S. Patent No. 6,521,964, dated February 18, 2003, issued to Jan, et al.;
67. U.S. Patent No. 6,531,369, dated March 11, 2003, issued to Ozkan, et al.;
68. U.S. Patent No. 6,531,740, dated March 11, 2003, issued to Bosco, et al.;

69. U.S. Patent Application Publication No. 2001/0009784 A1, dated July 26, 2001, issued to Ma, et al.;
70. U.S. Patent Application Publication No. 2002/0074598 A1, dated June 20, 2002, issued to Doyle, et al.;
71. U.S. Patent Application Publication No. 2002/0086472 A1, dated July 4, 2002, issued to Roberds, et al.;
72. U.S. Patent Application Publication No. 2002/0086497 A1, dated July 4, 2002, issued to Kwok;
73. U.S. Patent Application Publication No. 2002/0090791 A1, dated July 11, 2002, issued to Doyle, et al.;
74. U.S. Patent Application Publication No. 2003/0032261 A1, dated February 13, 2003, issued to Yeh, et al.;
75. U.S. Patent Application Publication No. 2003/0040158 A1, dated February 27, 2003, issued to Saitoh;
76. U.S. Patent Application Publication No. 2003/0057184 A1, dated March 27, 2003, issued to Yu, et al.;
77. U.S. Patent Application Publication No. 2003/0067035 A1, dated April 10, 2003, issued to Tews, et al.;
78. Rim, et al., "Transconductance Enhancement in Deep Submicron Strained-Si *n*-MOSFETs", International Electron Devices Meeting, 26, 8, 1, IEEE, September 1998;
79. Rim, et al. "Characteristics and Device Design of Sub-100 nm Strained Si N- and PMOSFETs", 2002 Symposium On VLSI Technology Digest of Technical Papers, IEEE, pp 98-99;
80. Scott, et al. "NMOS Drive Current Reduction Caused by Transistor Layout and Trench Isolation Induced Stress", International Electron Devices Meeting, 34.4.1, IEEE, September 1999;

81. Ootsuka, et al. "A Highly Dense, High-Performance 130nm node CMOS Technology for Large Scale System-on-a-Chip Application", International Electron Device Meeting, 23.5.1, IEEE, April 2000;
82. Ito, et al. "Mechanical Stress Effect of Etch-Stop Nitride and its Impact on Deep Submicron Transistor Design", International Electron Devices Meeting, 10.7.1, IEEE, April 2000;
83. Shimizu, et al. "Local Mechanical-Stress Control (LMC): A New Technique for CMOS-Performance Enhancement", International Electron Devices Meeting, IEEE, March 2001;
84. Ota, et al. "Novel Locally Strained Channel Technique for high Performance 55nm CMOS", International Electron Devices Meeting, 2.2.1, IEEE, February 2002.
85. Ouyang, et al. "Two-Dimensional Bandgap Engineering in a Novel Si/SiGe pMOSFETS With Enhanced Device Performance and Scalability", Microelectronics Research Center, pp 151-154, 2000 IEEE.
86. Sayama et al., "Effect of <Channel Direction for High Performance SCE Immune pMOSFET with Less Than 0.15um Gate Length"ULSI Development Center, pp27.5.1-27.5.4, 1999 IEEE.
87. European Patent Application Publication No. EPO 01/62362, 26/06/89, issued to Hasegawa, Michihiko;
88. European Patent Application Publication No. EP 1 174 928 A1, dated 01/23/02, issued to Hitachi Ltd.;
89. European Patent Application Publication No. EP 0 967 636 A2, dated 12/29/1999, issued to Rengarajan, et al.;
90. International Patent Application Publication No. WO 02/454156 A2, dated 06/06/2002, issued to Armstrong et al.;
91. International Application Publication No. WO 94/27317, dated 05/06/1993, issued to Winnerl, et al.;

In accordance with the waiver of 37 C.F.R. § 1.98 (a)(2)(i), per 1276 OG 55, August 5, 2003, applicants are not required to submit copies of the above-cited U.S. Patent references. Inasmuch as this Information Disclosure Statement is being submitted in accordance with the schedule set out in 37 C.F.R. § 1.97(b), no statement or fee is required.

Respectfully submitted,



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INFORMATION DISCLOSURE CITATION <i>(Use several sheets if necessary)</i>				Docket Number (Optional) FIS920030078US2 (16422A)		Application Number Unassigned	
				Applicant(s) Sadanand V. Deshpande, et al.			
				Filing Date Herewith		Group Art Unit Unassigned	

U.S. PATENT DOCUMENTS							
*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		3,602,841	08/31/71	McGroddy			
		4,655,415	05/12/87	Esaki, et al.			
		4,853,076	08/01/89	Tsaur, et al.			
		4,855,245	08/08/89	Neppl, et al.			
		4,952,524	08/28/90	Lee, et al.			

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*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2001/0009784 A1	07/26/01	Ma, et al			
		2002/0074598 A1	06/20/02	Doyle, et al.			
		2002/0086472 A1	07/04/02	Roberds, et al.			
		2002/0086497 A1	07/04/02	Kwok			

FOREIGN PATENT DOCUMENTS								
	REF	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	Translation	
							YES	NO
		EPO 01/62362	26/06/89	Hasegawa, Michihiko				
		EP 1 174 928 A1	01/23/02	Hitachi Ltd.				
		EP 0 967 636 A2	12/29/1999	Rengarajan, et al.				
		WO 02/454156 A2	06/06/2002	Armstrong et al.				
		WO 94/27317	05/06/1993	Winnerl, et al.				

OTHER DOCUMENTS		<i>(Including Author, Title, Date, Pertinent Pages, Etc.)</i>
		Rim, et al., "Transconductance Enhancement in Deep Submicron Strained-Si n-MOSFETs", International Electron Devices Meeting, 26, 8, 1, IEEE, September 1998;
		Rim, et al. "Characteristics and Device Design of Sub-100 nm Strained Si N- and PMOSFETs", 2002 Symposium On VLSI Technology Digest of Technical Papers, IEEE, pp 98-99;

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		5,006,913	04/09/91	Sugahara, et al			
		5,060,030	10/22/91	Hoke			
		5,081,513	01/14/92	Jackson, et al			
		5,108,843	04/28/92	Ohtaka, et al			

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		2002/0090791 A1	07/11/02	Doyle, et al			
		2003/0032261 A1	02/13/03	Yeh, et al			
		2003/0040158 A1	02/27/03	Saitoh			
		2003/0057184 A1	03/27/03	Yu, et al			

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		Scott, et al. "NMOS Drive Current Reduction Caused by Transistor Layout and Trench Isolation Induced Stress", International Electron Devices Meeting, 34.4.1, IEEE, September 1999;
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		5,134,085	07/28/02	Gilgen, et al			
		5,310,446	05/10/94	Konishi, et al			
		5,354,695	10/11/94	Leedy			
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		2003/0067035 A1	04/10/03	Tews, et al			

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		5,459,346	10/17/95	Asakawa, et al			
		5,471,948	12/05/95	Burroughes, et al.			
		5,557,122	09/17/96	Shrivastava, et al.			
		5,561,302	10/01/96	Candelaria			
		5,565,697	10/15/96	Asakawa, et al			

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		Ota, et al. "Novel Locally Strained Channel Technique for high Performance 55nm CMOS", International Electron Devices Meeting, 2.2.1, IEEE, February 2002.
		Ouyang, et al. "Two-Dimensional Bandgap Engineering in a Novel Si/SiGe pMOSFETS With Enhanced Device Performance and Scalability", Microelectronics Research Center, pp 151-154, 2000 IEEE.

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		5,592,007	01/07/97	Leedy			
		5,592,018	01/07/97	Leedy			
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Form PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. FIS920030078US2 (16422A)	SERIAL NO. Unassigned
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		6,284,623	09/04/01	Zhang et al.			
		6,284,626	09/04/01	Kim			
		6,319,794	11/20/01	Akatsu, et al.			
FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
							YES NO
OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
EXAMINER				DATE CONSIDERED			
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.							

INFORMATION DISCLOSURE CITATION <i>(Use several sheets if necessary)</i>				Docket Number (Optional) FIS920030078US2 (16422A)		Application Number Unassigned	
				Applicant(s) Sadanand V. Deshpande, et al.			
				Filing Date Herewith		Group Art Unit Unassigned	

U.S. PATENT DOCUMENTS							
*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,361,885	03/26/02	Chou			
		6,362,082	03/26/02	Doyle, et al			
		6,368,931	04/09/02	Kuhn, et al			
		6,403,486	06/11/02	Lou			
		6,403,975	06/11/02	Brunner, et al			

U.S. PATENT APPLICATION PUBLICATIONS							
*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE

FOREIGN PATENT DOCUMENTS								
	REF	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	Translation	
							YES	NO

OTHER DOCUMENTS			<i>(Including Author, Title, Date, Pertinent Pages, Etc.)</i>

EXAMINER	DATE CONSIDERED
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EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP Section 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Form PTO-1449		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. FIS920030078US2 (16422A)		SERIAL NO. Unassigned	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)				APPLICANTS Sadanand V. Deshpande, et al.			
				FILING DATE Herewith		GROUP ART UNIT Unassigned	
U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,406,973 B1	06/18/02	Lee			
		6,461,936	10/18/02	Von Ehrenwall			
		6,476,462 B1	11/05/02	Shimizu et al.			
		6,493,497	12/10/02	Ramdani, et al.			
		6,498,358	12/24/02	Lach, et al			
		6,501,121	12/31/02	Yu, et al.			
		6,506,652	01/14/03	Jan, et al			
FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
							YES NO
OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
EXAMINER				DATE CONSIDERED			
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.							

INFORMATION DISCLOSURE CITATION <i>(Use several sheets if necessary)</i>				Docket Number (Optional) FIS920030078US2 (16422A)		Application Number Unassigned	
				Applicant(s) Sadanand V. Deshpande, et al.			
				Filing Date Herewith		Group Art Unit Unassigned	

U.S. PATENT DOCUMENTS							
*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,509,618	01/21/03	Jan, et al			
		6,521,964	02/18/03	Jan, et al			
		6,531,369	03/11/03	Ozkan, et al			
		6,531,740	03/11/03	Bosco, et al			

U.S. PATENT APPLICATION PUBLICATIONS							
*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE

FOREIGN PATENT DOCUMENTS								
	REF	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	Translation	
							YES	NO

OTHER DOCUMENTS		(Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER	DATE CONSIDERED
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